

DOE COMPREHENSIVE EMERGENCY MANAGEMENT SYSTEM

A Current Perspective on DOE Order 151.1C
and Guidance Related to Planning for
Beyond-Design-Basis Events

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DOE Comprehensive Emergency Management System

- **DOE O 151.1C, *COMPREHENSIVE EMERGENCY MANAGEMENT SYSTEM***, establishes policy, assigns roles and responsibilities, and provides the framework for the development, coordination, control, and direction of the DOE Emergency Management System.
 - Establishes requirements for emergency planning, preparedness, readiness assurance, response, and recovery activities; and
 - Describes the approach for effectively integrating these activities under a **comprehensive, “all-emergency” concept**.

DOE Comprehensive Emergency Management System

DOE Emergency Management System *Mission*

Be ready to respond promptly, efficiently, and effectively to any emergency involving DOE/NNSA facilities or activities by applying the necessary resources to limit the severity of the event and mitigate consequences to workers, the public, the environment, and national security

DOE Site/Facility Emergency Management Programs

All DOE Sites/Facilities must have an Operational Emergency **Base Program** that...

- Provides a **framework for response** to serious events involving health and safety, the environment, safeguards, and security.
- Provides for **compliance with external regulations and plans** developed by other Federal Agencies and DOE/NNSA Offices, and with applicable State and local planning and preparedness requirements.
- Promotes the **effective and efficient integration** of all applicable policies, recommendations, and requirements, including Federal interagency emergency plans

DOE O 151.1C, page 4;
DOE G 151.1-1A, page 1-5

DOE Site/Facility Emergency Management Programs

The Base Program includes a **Hazards Survey** to identify the emergency conditions and impacts to be addressed by the comprehensive emergency management program.

- a) Identifies the **types of emergency conditions** (e.g., fires, explosions, work place accidents, natural phenomena, release of hazardous materials, etc.);
- b) Describes the potential health, safety, or environmental **impacts**;
- c) Identifies the **planning and preparedness requirements** that apply to each type of hazard, and;
- d) Indicates the need for **further analyses of hazardous materials** in an **Emergency Planning Hazards Assessment (EPHA)**, based on the results of hazardous material screening.

DOE Site/Facility Emergency Management Programs

- Site/facility Hazards Survey results may indicate that an **Operational Emergency Hazardous Material Program** is required.
 - Each site/facility or activity that produces, processes, handles, stores, or transports hazardous materials (radioactive, chemical, hazardous biological agents and toxins) in quantities that could pose a serious threat to workers, the public, or the environment must have a **Hazardous Material Program**.
 - The site/facility must analyze hazardous materials identified by the Hazards Survey screening process and document the analysis in an **EPHA**.

DOE Site/Facility Emergency Management Programs

- The EPHA identifies and quantitatively analyzes potential **Operational Emergencies** involving airborne releases of hazardous materials
 - Hazardous Material Operational Emergencies that could threaten workers beyond the local event scene and the public will require classification as **Alert, Site Area Emergency, or General Emergency**
 - These Operational Emergency Classes serve a key role in defining the capabilities and resources needed to satisfy the DOE emergency management **mission** for hazardous material emergencies

DOE Site/Facility Emergency Management Programs

The set of events and conditions analyzed in the site/facility EPHA that represents the spectrum of possible initiators and severity levels involving releases of hazardous materials that could affect workers, the public, or the environment at a facility or activity is...



Technical Planning Basis

DOE G 151.1-2, pages 2-8

Site/Facility Technical Planning Basis

Technical Planning Basis results from a systematic examination of hazardous materials associated with a facility/site or activity, including:

- **Failure modes** defining potential releases to the environment for each substance in each location in the facility/site or activity
- A range of different **failure mode/initiating event** combinations (i.e., scenarios) are considered. Initiating events include:
 - Accidents (e.g., fire, explosion, loss of confinement or containment, onsite transportation accidents);
 - Natural phenomena (e.g., earthquakes, tornadoes, floods);
 - External events (e.g., aircraft crashes, offsite transportation accidents involving hazardous materials, pipeline explosions); and,
 - Terrorism, sabotage, or other malevolent acts

Site/Facility Technical Planning Basis

- EPHA analysis yields the Technical Planning Basis:
 - Provides detailed **characteristics** of hazardous materials necessary for developing an effective emergency management program
 - Analysis of a **spectrum (range)** of potential releases to provide conservative estimates of severity of consequences
 - Identifies symptoms/indications to aid in **recognition** of possible emergency conditions
 - Represents a valid technical foundation for developing an emergency management program that is “**commensurate with hazards.**”

DOE G 151.1-2, pages 2-3 and 2-4

Site/Facility Technical Planning Basis

- A spectrum of potential events ranging from low-consequence, high probability events to high-consequence, low-probability events, including those considered to be BDBEs, are postulated and realistically analyzed.
- The DOE approach requires a degree of planning even for events whose severity exceeds the design basis for safety controls
- The site/facility or activity must be prepared to take actions to limit or prevent adverse health and safety impacts to workers and the public.

Spectrum of Events

- High-probability, low-consequence events should be addressed in facility emergency plans (and in EPHAs) because of their potential impacts on workers in the affected facility and those nearby
- Both malevolent events, which are seldom analyzed in Documented Safety Analyses (DSAs), and Beyond-Design-Basis Events (BDBEs) should also be included in the EPHA. These events typically represent the upper end of the consequence spectrum.

Spectrum of Events

- Most natural phenomena events to be analyzed *[specifically, as initiators of hazardous material releases]* can be selected from the DSA for the facility.
- Typically, two events may be defined for each type of natural phenomenon (applicable to the specific site/facility or activity) – **Design-Basis Event (DBE)** used to determine safety control systems, as well as a **Beyond-Design-Basis Event (BDBE)**
 - Both events are derived from historical data. If no BDBEs are available in DSAs, the event(s) can be obtained directly from historical data for the region.

Spectrum of Events

- The spectrum of events and conditions analyzed should include those exclusively affecting onsite personnel, as well as those also affecting the offsite public.
- Analysis of a spectrum of events does not mean analysis of every imaginable event.
- The goal is to create a comprehensive picture of the types of events and a range of associated consequences that could occur at a facility.
- This comprehensive picture of events and consequences will then serve as the **Technical Planning Basis** for DOE emergency response planning.

Catastrophic Events

- Some **catastrophic** events (e.g., a dam failure that floods an entire site, meteor strike, nuclear detonation) may be candidates for exclusion from detailed emergency management planning, not simply based on a probability criterion, but on the grounds that...
 - *The consequences of the initiating event will effectively overwhelm or negate the planned initial response to any resulting hazardous materials release*

Catastrophic Events

- For such events, mitigation of which is expected to be well **beyond any site's response capabilities**, the principal function of the local (site/field element) emergency management component is to **recognize** the occurrence and initiate earliest possible **notifications** of DOE Headquarters and others.
- In such circumstances, **the initiating event itself** and its **immediate safety implications** may become the overriding priority and focus of initial **response activities**.

“Last Line of Defense”

- Key Principle of DOE Emergency Management System:
 - If controls/safeguards on hazardous materials fail, then emergency management is the “**LAST LINE OF DEFENSE**” in protecting workers, the public, and the environment
 - Some level of emergency response planning is required even for BDBE.
 - In general, emergency events or conditions should not be excluded from the Technical Planning Basis, based solely on calculated occurrence probabilities or designation such as “incredible” or “beyond extremely unlikely”

DOE G 151.1-1A, page 1-4;
DOE G 151.1-2, page 2-10

“Last Line of Defense”

- Emergency Management must plan for extreme events that other analyses may exclude:
 - Low probability, high consequence events
 - Analysis of releases with failed controls
 - Beyond-Design-Basis Events (BDBEs)